CHAPTER I

INTRODUCTION

Rice is the most important food product of Thailand since it provides the majority of calories in the normal Thai diet [1-3]. With more than 40,000 rice varieties in the world, rice can be classified using many different characteristics including taste, smell, grain characterization, colour and nutritional content. Economically, rice prices vary on the specific properties of each variety. Fragrant rice is more expensive than non-aromatic rice. Moreover, high consumer demand has focused rice production on quality more than price. For instance, the two most popular fragrant rice varieties are Thai Hom Mali and Basmati [1-4]. Thai Hom Mali is a favourite high-quality rice in Europe, Middle Asia, Hong Kong, Singapore and the United States. The high-price of Hom Mali is due to its perceived high quality and any problems with contamination by lower quality varieties could adversely affect its value. There are many methodologies that have been investigated to classify rice including the basic phenotypic techniques (for example grain characteristics; colour and length-to-width ratio) and advanced techniques (for example amylose content, chemical methods, and DNA fingerprinting) [5-9]. However, rice characteristic analyses are limited by their properties. The selection of an investigation technique depends on the study objective. For example, grain colour investigation is one method to classify some varieties (Paddy and sticky rice). Size grain investigation can also classify some rice varieties; ie. *Japonica* grain is shorter than Thai Hom Mali. Amylose content technique can only discriminate between sticky and Paddy rice. The DNA fingerprint method is limited by investigator skill,

investigation cost. Another technique uses gas measurements to determine the presence of volatile compounds. This method only requires a small sample to provide a high performance sample measurement that can identify the 2AP quantity. The chemicals produced in this investigation are friendly for creatures and the environment.

Different classification research projects have used statistical methods to determine chemical groupings and chemical property classification. For example, for Nebbiolo-based wine (Piedmont) classification statistical methods were used to analyse different types of wine. In this case, principal component analysis (PCA) was used to extract the chemical compounds in the wine samples to determine the chemical characteristics. Hierarchical cluster analysis (HCA) and stepwise linear discriminant analysis (SLDA) were used to classify the different wine samples from different vintages [10]. In other studies, aroma-volatiles were classified including in the melon and for cheese classification [11, 12]. These studies also applied multivariate statistics to provide an overall summary in those research projects.

1.1 Objective

The research objective in this thesis is to classify Thai fragrant rice varieties (under different storage durations) using headspace gas chromatographic profiles in conjunction with statistical methods.

1.2 Outline

The outline of this thesis is as follows:

Chapter II presents the necessary background to understand the biochemical concepts and statistical methods. The biochemical concepts include biochemical techniques for rice classification (characteristics, varieties and condition plant), chemical expression in the experiment, data preparation and the biochemical techniques. Literature reviews is described to summary and explain complete and current state of knowledge for classification Thai fragrant rice.

Chapter III describes the materials and methodology used in this study. There are four parts; 1) rice sample and preparation, 2) HS-GC analysis, 3) chemical profile data, and 4) statistical methods for classification and calibration.

Chapter IV shows the results of chemical profile data in the different durations for each fragrant rice variety. The percentages of accuracy are presented to demonstrate the appropriate of the classification models from HS-GC profiles combined with statistical methods.

Chapter V contains the contributions and conclusions.